

## Synaptonemal complex (SC)

At zygotene sub-stage of prophase -I of meiosis cell division, the maternal and paternal chromosome of a homologous pair come closer and form an intimate pairing, known as **Synapsis**. Earlier it was thought that this synapsis is a simple pairing, but after the advancement of electron microscopy, it is revealed that this pairing is actually a highly organized structure which is remarkably precise and point to point and there is a mutual attraction between the allelic genes. **Montrose J. Moses (1955)** has described this structure as **Synaptonemal complex**. The SCs have subsequently been described in several species of plants and animals by different workers.

### Structure of Synaptonemal complex

In ultrastructure, the SCs show a tripartite ribbon like structure and is situated between pairing homologous chromosome. The three parallel dense lines are equally spaced in a plane. The central element is of variable prominence, where as the two lateral elements are very dense. Each lateral element is attached on the inner side of a homologous chromosome. Some fine transverse strands are present between lateral elements and the central element called transverse units or LC fibers. The lateral elements varies in width from  $300\text{Å}$  to  $500\text{Å}$  and the two lateral units are situated  $900\text{Å}$  to  $1200\text{Å}$  apart. The central elements vary in width from  $150\text{Å}$  --  $500\text{Å}$ . The lateral elements show subdivision into two longitudinal components. The central elements may also appear as a tripartite bar with ladder like transverse connections.

The electron microscopy shows that a series of lateral loops of chromatin arises from the lateral elements, which make up the substance of chromosome. A series of smaller loops which fuse in the middle line to make up the central element. The transverse part of the loops forms the transverse unit or LC fibers. The central element is simple in some organism and tripartite in others. In case of tripartite central elements, the elements are made up of a series of interdigitating

loops. Each lateral element consist of two protein filaments, one for each sister chromatid.

### **Function of SCs**

SCs appear during the exchange of chromatids in meiosis. Meyer (1964) reported that the SCs involved in chiasmata formation and crossing over, on the basis of his observation that the SCs are absent in achiasmatic meiosis. However, SCs are also reported in some species where no chiasmata formation occurs. Depending on this fact, Moses (1968) has reported that SCs must be present for chiasmata formation but, presence of SC not necessarily mean that chiasmata are present

**NB: Photo image occupy space beyond 1MB, so cannot be uploaded here. It will send to you in WhatsApp. You may also draw figures from “Cell Biology”- by C.B. Power**